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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231

Inventor: **Johnson, H. et al.** ✓  
Serial No: **09/933,596** ✓  
Filed: **August 20, 2001** ✓  
For: **Configurations and Methods  
for Improved Copper  
Distribution Uniformity in  
Printed Wiring Boards**

Examiner: **Tuan T. Dinh**

Art Unit: **2827**

#6/B  
Amst  
J. McMillan  
8/9/02  
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TECHNOLOGY CENTER 2800

### RESPONSE TO OFFICE ACTION

The Honorable Commissioner  
of Patents and Trademarks  
Washington, D.C. 20231

Dear Sir:

This paper responds to the Office Action dated April 25, 2002. Please enter the following:

#### IN THE CLAIMS

1. (Amended) An electronic device comprising:

a dielectric substrate having a first surface and a second surface, and a via connecting the first and second surfaces, wherein the via has a horizontal cross sectional area;

a first and a second sacrificial copper structure deposited onto the first and the second surface and surrounding the via, respectively, wherein each of the first and second sacrificial copper structures covers an area of no more than three times the horizontal cross sectional area of the via; and

wherein the first and the second sacrificial copper structures are formed on the substrate via a photolithographic process.

## REMARKS

### Drawing Objections

The Examiner objected to the drawing on the basis that "...cross-hatching is not shown in each Figure". It is not clear to the applicant to what feature in the Figures the Examiner refers to, however, will submit formal drawings conforming to USPTO standards in due course.

### Claim Objections

Claim 1 was objected to as containing a typographic error. The applicant agrees and corrected the objected term "first and second surface" to -- first and second surfaces --.

### 35 USC § 102

**Claims 1-5 and 7-10** were rejected under 35 USC § 102(b) as being anticipated by Boyko et al. (U.S. Pat. No. 5,450,290). The applicant disagrees, especially in view of the amendments set forth herein. As amended herein, claim 1 (and claims 2-5 and 7-10 by virtue of their dependence on amended claim 1) all require that "...first and...second **sacrificial** copper structures...[must be]...**deposited onto** the first and the second surfaces...via a **photolithographic process**. The specification defines the term "sacrificial copper structure" as a copper structure that at least partially surrounds a via, and that **is at least partially (and more typically completely) removed in a following process step**. Furthermore, such structures must be deposited onto the first and the second surfaces.

Boyko et al. fail to teach sacrificial copper structures as defined by the applicant, let alone sacrificial copper structures that are deposited onto the first and the second surfaces via a photolithographic process. Therefore, amended claim 1, and claims 2-5 and 7-10 by virtue of their dependence on amended claim 1 are not anticipated by Boyko et al.

Claims 1-5 and 7-10 are **also not obvious** over the Boyko reference since there is no teaching, motivation, or suggestion to modify the via structures of Boyko in a manner such as to arrive at the subject matter as presently claimed. On the contrary, Boyko's copper structures (Numeral 18) are inside the via, and thus not deposited onto the first and second surfaces of the dielectric substrate. Consequently, such copper structures are not at least partially (and more

typically completely) removed in a following process step, because partial or complete removal would likely result in an inoperative device. Thus, **Boyko et al. teach against the presently amended claims.**

**35 USC § 103**

**Claim 6** was rejected under 35 USC § 103 as being obvious over Boyko et al. (U.S. Pat. No. 5,450,290). The applicant disagrees, especially in view of the amendments set forth herein.

First, not all of the elements are taught by Boyko et al. (claim 6 is dependent on independent amended claim 1, for missing elements see above). Second, there is also no teaching, suggestion, or motivation in the '290 reference to modify Boyko's via in a manner such as to arrive at the via structure as presently claimed. On the contrary, Boyko et al. teach against the subject matter as presently claimed (see above).

**ATTACHED MARKED-UP VERSION OF CHANGES**

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

**REQUEST FOR ALLOWANCE**

Claims 1-10 are pending in this application. The applicant requests allowance of all pending claims.

Respectfully submitted,

Rutan & Tucker, LLP

Dated: July 8, 2002

By:



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